REMARKS

Favorable reconsideration of this application in view of the remarks to follow is respectfully requested. Since the present Response raises no new issues, and in any event, places the application in better condition for consideration on appeal, entry thereof is respectfully requested under the provisions of 37 C.F.R. §1.116.

Applicants acknowledge, with thanks, the Examiner's indication in the Office Action dated March 31, 2003 that Claims 21-22 are allowable over the art of record. Although allowance of Claims 21-22 is indicated, applicants, at the present time, would like to obtain a patent including all the claims pending in the present application.

Claims 1-20 stand rejected under 35 U.S.C. §103(a) as allegedly obvious over U.S. Patent No. 6,228,678 to Gilleo, et al. ("Gilleo, et al.") in view of U.S. Patent Publication No. 2002/0105092 to Coyle ("Coyle"). Applicants respectfully disagree and submit the following.

First, applicant asserts that the secondary reference Coyle is not prior art to the present invention insofar as the present invention was completed in this country before February 2, 2001. The Coyle reference, a secondary reference upon which the obviousness rejection is predicated, is effective as prior art as of February 2, 2001, its U.S. filing date.

Submitted herewith in this regard, is an unsigned copy of a Declaration under 37 C.F.R. §1.131 by Stephen L. Buchwalter, David Danovitch, Fuad Doany, Claudius Feger, Peter A. Gruber, and Nancy C. LaBianca, the available joint inventors of the above identified patent application. Revathi Iyengar the remaining joint-inventor is no longer affiliated with International Business Machines Corp., the assignee of the present application, and despite efforts to contact Revathi Iyengar, she was unavailable for signature in the present affidavit. Applicants note that a signed copy of the 131 Declaration will be submitted in due course.

In the declaration, submitted under the provisions of 37 C.F.R. §1.131, the available joint inventors attest and show by attached exhibits that the present invention directed to:

> A method of forming a microelectronic interconnect structure containing a bilayer underfill layer comprising the steps of forming a first polymeric on a surface of a semiconductor wafer having interconnect pads disposed thereon; patterning the first polymeric material to provide openings that expose the interconnect pads; forming conductive bump material in the openings; forming a second polymeric material that is partially cured to a B-stage state atop the first polymeric material and the conductive bump material; dicing the semiconductor wafer into individual chips; and bonding at least one of said individual chips to an external substrate, wherein during bonding the conductive bump material penetrates the second polymeric material and contacts a surface of the external substrate.

was completed in laboratories at IBM Corporation in Yorktown Heights, NY prior to the February 2, 2001 filing date of Coyle.

The Declaration including Exhibits A(i), A(ii), and B evidences a method in which a bilayer underfill is utilized in producing a microelectronic device. Figures are provided in Exhibit A(ii) that show the conductive bump material deposited into the openings of the first polymeric layer followed by depositing a second polymeric layer thereon; where during bonding the conductive bump material penetrates the second polymeric material to contact a surface of an external substrate. Exhibit B includes a true photocopy of a transmission electron micrograph of the conductive bump material and bilayer underfill of a microelectronic device formed from the above method, furthering providing reduction to practice of the present invention prior the February 2, 2001 filing date of Coyle.

Clearly, the information provided by the attached Declaration, under 37 C.F.R. §1.131, indicates that the present invention was completed by the present applicants in the United States prior to the effective filing date of the applied reference. Consequently, Coyle is antedated and cannot be used as a reference against the claims pending in this application. Therefore, in view of the foregoing, the §103 rejection, is solely based on the primary reference, Gilleo, et al.

Applicants respectfully submit that Gilleo, et al. fail to teach or suggest applicants' claimed invention and submit the following.

Applicants submit that the claims of the present application are not rendered obvious by the disclosure of Gilleo, et al. because the applied reference fails to teach or suggest the limitations of applicants' claimed method. Specifically, the applied reference fails to teach or suggest, "*forming a second polymeric material that is partially cured to a B-stage state atop said first polymeric material and said conductive bump material*", as recited in amended Claim 1. Applicants observe, referring to Page 5 of the Final Rejection dated December 4, 2002, that the Examiner agreed that, "Gilleo fails to teach a partially cured second polymeric material over a first polymeric material and conductive bump material".

Additionally, Gilleo, et al. fail to teach or suggest partially curing the second polymeric material to a B-stage state. Curing a polymeric material to a B-stage state requires advancing the reaction of a thermosetting polymer to below the gel point to which the material becomes insoluble; the gel point is the point at which cross-linking occurs. B-staging renders thermosetting materials non-tacky since it raises the glass transition temperature of the polymer to above room temperature. Tacky materials are soft at room temperature. In thermoplastics, this is not possible because thermoplastics do not react. Thermoplastics do not cross-link because all the reactions to the polymer backbone have concluded.

Gilleo, et al. do not teach or suggest partially curing the second polymeric layer to a B-stage state. Applicants observe that one embodiment of the Gilleo, et al. disclosure is a first polymeric layer which includes a thermoplastic resin as the main component and a B-stage thermoset as a lesser component. Although Gilleo, et al. disclose that B-stage thermosets may be present in the first polymeric layer, there is no teaching or suggestion of a B-stage thermoset being utilized in the second polymeric layer. Referring to Column 8, line 43-65, the second

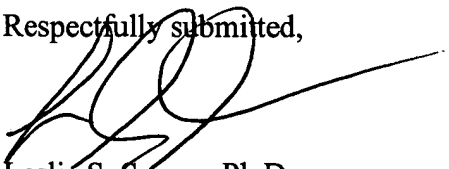
polymeric layer disclosed in Gilleo, et al. comprises a flux system including epoxy resins. Applicants note, referring to Page 5 of the present Office Action, the Examiner agrees that Gilleo, et al. fail to teach that the second polymeric material is partially cured to a B-stage state as recited in Claim 1.

Additionally, Gilleo, et al. disclose the use of thermoplastic polymers as the main component of the underfill. Specifically, Gilleo, et al. referring to Column 7, lines 29-31, disclose that their method eliminates the problems associated with thermoset underfills by incorporating thermoplastics. Therefore, the Gilleo, et al. disclosure teaches away from applicants' claimed invention because Gilleo, et al. favor thermoplastics that cannot be cured to a B-stage state.

"To establish a prima facie case of obviousness of a claimed invention all the claimed limitations must be taught or suggested by the prior art". *In re Wilson,* 424 F.2d 1382, 1385, 165 USPQ 44, 496 (CCPA 1970). Therefore, since Gilleo, et al. does not disclose *forming a second polymeric material that is partially cured to a B-stage state atop said first polymeric material and said conductive bump material* and instead teaches away from partially curing a second polymeric material to a B-stage state; Gilleo, et al. fail to teach or suggest all of the claimed limitations of the applicants' method as recited in Claim 1. Based on the above remarks, the §103 rejection has been obviated; therefore reconsideration and withdrawal of the instant rejection is respectfully requested.

In summary, applicants respectfully submit that this application is in condition for allowance. Accordingly, applicants respectfully request that this application be allowed and a Notice of Allowance be issued. If the Examiner believes that a telephone conference with the applicants' representatives would be advantageous to the disposition of this case, the applicants request that the Examiner telephone the undersigned.

Respectfully submitted,



Leslie S. Szivos, Ph.D.
Registration No. 39,394

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza
Garden City, New York 11530
(516) 742-4343

LSS:HAH:kc
Enclosures Declaration under 37 CFR 1.131
Exhibits A(i), A(ii) and B